



Title: Influence of landscape change on variable saturation areas

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Organization: University of South Florida

State: FL **Region:** Southern

Year of Funding: 2002

Theme: Watershed Management

Situation: Many forested wetlands in the US thrive in Variable Saturation Areas (VSA). In these areas, surface inundation is supported by a shallow water table, which rises and inundates the surface during the wet season, and gradually declines in the dry season, creating a cycle of surface inundation. This cycle of inundation, recognized as the hydroperiod of VSA, controls the ecological function and the community of plant species in the wetland. Because most VSA are sinks receiving regional fluxes of water and nutrients, there is a need to understand how land development in one part of the watershed influences the hydroperiod of VSA downstream. Most urban areas and agricultural areas are upstream of VSA, and there is a need to understand across landscape fluxes of water and nutrients to assess their impacts on the hydroperiod of VSA. Target audiences for this research are water management districts, county and permitting agencies, and the general public.

Objectives: Objectives of this project:(1) Understand, within a regional landscape, the topographic settings that affect the spatial and temporal formation in VSA. (2) Field monitor and model seepage fluxes across landscapes. (3) Model how upstream changes in boundary conditions associated with land use change affect VSA.

Methods: The methods employed included field monitoring of shallow water tables and two dimensional flow modeling across a transect encompassing different vegetation cover. Peer reviewed publications supported through this project are (a) Analytical Expressions for Transient Specific Yield and Shallow Water Table Drainage. Water Resources Research, 2002, vol. 38, no. 10. Author: M. H. Nachabe. (b) Modeling Runoff from Variable Source Areas in Humid, Shallow Water Table Environment. Journal of the American Water Resources Association, 2003, vol. 39, no 1. Authors: Tatiana Hernandez*, M. Nachabe, M. Ross, and J. Obeysekera. (c) Profile Soil Water Storage above a Shallow Water Table. Accepted pending revision, Soil Science Society of America Journal. Authors: Caroline Masek*, M. Nachabe, and J. Obeysekera. (d) Calibration and Application of a Two Dimensional Finite Element Model to Simulation Variable Root Water Uptake. Accepted pending revision, ASCE Journal of Irrigation and Drainage Engineering. Authors: M. DeSilva*, M. Nachabe, and J. Simunek. (e) Influences of Land Use Change and Topographic Attributes on Hydrology of Shallow Water Table Environments. Authors: M. DeSilva* and M.Nachabe. *Student of the PI.

Partnerships: Partnerships supported through this project included technical collaborations with South Florida Water Management District, Southwest Florida Water Management District, and Tampa Bay Water. The PI partners with staff from these agencies to better achieve the goals of the project and to increase awareness of issues addressed. These staff served as members on graduate students committees and attended professional presentations related to this project.

Research: Funding from project used to support the dissertations of three graduate students. All graduate students have reached to their community by giving technical presentation and publishing in both refereed journals and conference proceedings.

Resources: This project was used to encourage other agencies (namely water management districts) to look at watershed management issues. These agencies ended up funding the PI.

Results: Output included convening a technical session by the PI at the annual AGU meeting in San Francisco in December 2003. The session is closely related to this project and its title is "Variable saturation zones: landscape attributes and sustainability of watershed biogeochemical processes and ecological functions". In addition, we reached through technical presentations to a number of participants including staff and audience at South Florida Water Management District, Southwest Florida Water Management District, and Tampa Bay Water. Graduate students on this project participated in technical presentation at annual AGU meetings, the annual AWRA conference in Miami, and in the joint Conference on the Science and Restoration of the Greater Everglades and Florida Bay Ecosystem.



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